Prob/Stat/Discrete
Unit 9 Practice Test

Name Key

1) Patrick borrows $6000 at a 3% simple interest rate for 2 years. Find the amount of interest accrued.

Find I

$P=6000$ $r=.03$ $I=Prt$ $t=2$

$I=6000(.03)(2)=\$360$

2) Heather invests $20,000 for 9 months in an account that earns a simple interest rate of 8%. How much interest will she earn?

Find I

$t=\frac{9\text{ mo.}}{12\text{ mo}}=.75$ year

$I=Prt$

$I=20000(.08)(.75)=\$1200$

3) Franklin borrows $12,000 at 12.5% simple interest for 60 days. How much interest will he have to pay back (assume that a year has 360 days)?

$\frac{60\text{ days}}{360\text{ days}}=\frac{1}{6}$ year or $.1\overline{6}$ year

use .16666667 in calculator

$I=12{,}000(.125)\left(\frac{1}{6}\right)$

$I=\$250$

4) Catherine invests $3500 for 4 months at a rate of 10.5%. Find the future value of the investment, rounded to 2 decimal places.

$\frac{4\text{ mo}}{12\text{ mo}}=\frac{1}{3}$ year $=.\overline{3}$

$A=P(1+rt)$

$A=3500(1+(.105)(.33333))$

$A=\$3622.50$

5) Karina borrows $12,000 at a rate of 8.2% for six years. How much will she have to pay back, in total?

$A=P(1+rt)$

$A=12000(1+(.082)(6))$

$A=17904$

or $I=Prt$ Find $P+I$, which is the same as future value: $A=P(1+rt)$

$I=12{,}000(.082)(6)$

$I=5904$

Total: $12000+5904=17904$

6) Bill invested $5000 in a savings account earning simple interest. Find the interest rate if the value of the account was $5750 after two years. $t=2$

future value

$A=P(1+rt)$

$\frac{5750}{5000}=\frac{5000(1+r\cdot 2)}{5000}$

$1.15=1+2r$

$\frac{.15}{2}=\frac{2r}{2}$

$.075=r$

$r=7.5\%$

other way: how much interest?

$5750-5000=750$

$I=Prt$

$750=5000\cdot r\cdot 2$

$750=10000r$

$r=\frac{750}{10000}=.075$

$r=7.5\%$

7) $7000 is deposited in an account that earns 3%, compounded each year. Find the total value of the investment after 5 years.

compounded annually $\Rightarrow A=P(1+r)^t$

$A=7000(1+.03)^5=\$8114.92$

8) Danielle deposits $2500 into an account earning 4%, compounded monthly. How much money will be in the account after 20 years?

$n=12$ $\Rightarrow A=P\left(1+\frac{r}{n}\right)^{nt}$

$A=2500\left(1+\frac{.04}{12}\right)^{12\cdot 20}$

$A=\$5556.46$

9) A mother invests $2500 in a bank account at the time of her daughter's birth. The interest is compounded quarterly at a rate of 10%. What will be the value of the daughter's account on her twentieth birthday, assuming no other deposits or withdrawals are made during this period?

$n=4$ $\quad t=20$

$$A = 2500\left(1+\frac{.10}{4}\right)^{4\cdot 20} = \$18{,}023.92$$

10) $300 is deposited into an account that is compounded continuously at a rate of 7.5%. Find the total value of the account after 30 years.

$A = Pe^{rt}$

$$A = 300\,e^{.075\times 30} = 2846.32$$

Note: To get "e" in the calculator: 2nd LN

11) How long would it take for $500 to become $5000 if it was invested in an account that earned 8% interest, compounded semi-annually? If needed, round your answer to the nearest tenth.

Find t: use LN

$n=2$ $\quad P=500 \Rightarrow A=5000$

$$\frac{5000}{500} = \frac{500\left(1+\frac{.08}{2}\right)^{2t}}{500}$$

$$LN(10) = LN(1.04)^{2t}$$

$$\frac{LN(10)}{2LN(1.04)} = \frac{2t\,LN(1.04)}{2\,LN(1.04)}$$

$29.4 = t$

It would take over 29 years.

12) Find the number of years it would take for $1000 to grow to $30,000 if it is in an account that earns 9% interest, compounded monthly. $n=12$

$A = P\left(1+\frac{r}{n}\right)^{nt}$

$$30{,}000 = 1000\left(1+\frac{.09}{12}\right)^{12t}$$

$$30 = (1.0075)^{12t}$$

$$LN(30) = LN(1.0075)^{12t}$$

$$\frac{LN(30)}{12\cdot LN(1.0075)} = \frac{12t\cdot LN(1.0075)}{12\cdot LN(1.0075)}$$

Solve for t

$37.9 = t$

It would take about 38 years

13) In order to plan for retirement, Jonathon deposits $1500 every six months into an annuity that earns 5% compounded semiannually. How much money will be in the annuity after 8 years?

$n=2$

$A = \frac{P\left(\left(1+\frac{r}{n}\right)^{nt}-1\right)}{\left(\frac{r}{n}\right)}$

$$A = \frac{1500\left(\left(1+\frac{.05}{2}\right)^{2\times 8}-1\right)}{\left(\frac{.05}{2}\right)}$$

$A = \$29{,}070.34$

14) Belinda deposits $5500 at the end of each year for 4 years into an annuity earning 7%, compounded annually. Find the total value of the annuity after 4 years.

$A = \frac{P\left((1+r)^{t}-1\right)}{r}$

$$A = \frac{5500\left((1+.07)^{4}-1\right)}{.07}$$

$A = \$24{,}419.69$

15) Use the stock table for Harley Davidson to answer the following questions.

a) b) c) d) e) f) g)

52 week high	52 week low	Stock	Sym	Div per share	Yld% Annual Return	PE	Vol 100s	Hi	Lo	Close	Net Chg
64.06	26.13	Harley Dav	HDI	0.16	0.3 %	41	5458	61.25	59.25	61	+1.75

annual

a) What were the high and low prices for the last 52 weeks?

high: 64.06 Low: 26.13

b) If you owned 900 shares of stock last year, what is the dollar amount of the dividend you received?

0.16 per share ⇒ total $900(0.16) = \$144$

c) What is the annual return for dividends alone?

0.3%

yesterday

d) How many shares of the company's stock were traded yesterday?

5458 is the volume in 100s ⇒ $5458 \times 100 = 545{,}800$ shares

e) What were the high and low prices for shares yesterday?

high: \$61.25 low \$59.25

f) What was the price at which the company traded when the stock exchange closed yesterday?

\$61

g) What was the change in price for a share of stock from the market close two days ago to yesterday's market close?

+1.75 (up \$1.75)

h) Compute IBM's annual earnings per share using: $\frac{\text{Yesterday's closing price per share}}{\text{PE ratio}} = \frac{61}{41} = \$1.49$ per share

For #16 – 17: Round answers to the nearest dollar.

16) The cost of a home entertainment center is \$4000. We can finance this by paying \$500 down and \$312.50 per mo. per month for 12 months. Determine: the amount financed, the total installment price, and the finance charge.

↳ LOAN
4000
− 500 paid
\$3500

TOTAL paid:
$500 + 312.50(12)$
$= 4250$

↳ INTEREST:
How much extra did you pay?
4250
−4000
\$250

17) The cash price for furniture for all rooms of a three-bedroom house is $15,000. The furniture can be financed by paying $300 down and $350 per month for 48 months.
Determine the amount financed, the total installment price, and the finance charge. (interest)

15000 − 300 = 14,700 financed

300 + 350(48) = 17,100

17,100 − 15,000 = $2,100

18) A particular credit card calculates interest using the unpaid balance method. The monthly interest rate is 1.5% on the **unpaid balance** on the first day of the billing period less payments and credits. Here are some of the details in the June 1-June 30 itemized billing. The balance at the end of June is $1300.

Date	Description	Amount
July 10th	Payment	$200
July 13th	Airline tickets	$380
July 17th	Car repair	$120
July 24th	Groceries	$140

a) Find the interest accrued in July.

Interest is based on the unpaid balance: 1300 owed − 200 paid = 1100

Interest: 1.5% of 1100
.015 × 1100 = $16.50

b) Find the total balance owed on the last day of the billing period.

1300 − 200 + 380 + 120 + 140 + 16.50 (interest) = $1756.50 balance owed (end of July)

c) This credit card requires a $10 minimum monthly payment if the total balance owed on the last day of the billing period is less than $360. Otherwise, the minimum monthly payment is $\frac{1}{36}$ of the balance owed on the last day of the billing period, rounded to the nearest whole dollar. What is the minimum monthly payment due by ~~July 9?~~ Aug 9.

Typo!

The next month's min. payment is $\frac{1}{36}$ of July's balance:

$\frac{1756.50}{36} = \$48.79 \Rightarrow \$49$

19) The price of a home is $330,000. The bank requires a 5% down payment. After the down payment, the balance is financed with a 30-year fixed-rate mortgage at 8.5%. Determine the monthly mortgage payment (excluding escrowed taxes and insurance) to the nearest dollar.

5% of 330,000
= .05 × 330,000
= 16,500 down

loan: 330,000 − 16,500 = 313,500

$PMT = \frac{313500\left(\frac{.085}{12}\right)}{\left(1-\left(1+\frac{.085}{12}\right)^{-12\times 30}\right)} = \$2410.54$

↳ $PMT = \frac{P\left(\frac{r}{n}\right)}{\left(1-\left(1+\frac{r}{n}\right)^{-nt}\right)}$

a) $2426 b) $2411 c) $2399 d) $2511

Rounded to nearest dollar

20) The price of a home is $320,000. The bank requires a 15% down payment. The cost of the home is financed with a 30-year fixed-rate mortgage at 6.5%.

a) Find the required down payment. 15% of 320,000

$.15 \times 320{,}000 = \boxed{48{,}000}$

b) Find the amount of the mortgage.

$320{,}000 - 48{,}000 = \boxed{\$272{,}000}$

c) Find the monthly payment (excluding escrowed taxes and insurance.) Round your answer to the nearest dollar.

$$PMT = \frac{272000\left(\frac{.065}{12}\right)}{\left(1-\left(1+\frac{.065}{12}\right)^{-12\times 30}\right)} = 1719.23 \Rightarrow \boxed{\$1719}$$

d) Find the total cost of interest over 30 years. Round your answer to the nearest dollar.

Paid $(1{,}719)(12)(30) = 618{,}840$ (to pay off loan)

$-\ 272{,}000$ (loan amount)

$\boxed{346{,}840}$ INTEREST

Note: The interest alone was more than the original cost of the house.

→ Take time to find the best interest rate you can.

→ If rates are high when you purchase, you can re-finance when rates drop lower.

→ If you can make larger monthly payments it makes a big difference when you pay it off quicker — much less interest that way.