Math 121, Spring 1997. Dr. Howard

Test 2 Solution Key

To receive extra credit points, you must execute all commands, then print out the resulting worksheet. Remember, the Maple commands are the red text. Just click your mouse onto the appropriate line and press ENTER.

1. Determine the domain of each expression:

(a). $\sqrt{x-4}$: domain = { x : $4 \le x$ }.

(b). $\frac{x-2}{x+5}$: domain = { x : $x \neq -5$ }.

2. Write each of the following expressions in simplest form:

(a). $\frac{2\,x\,y}{x^2+3\,x\,y}$

```
> simplify( 2*x*y/(x^2+3*x*y) );
```

(b). $\frac{x}{x+2}-\frac{2}{3\,x-1}$

```
> simplify( x/(x+2)-2/(3*x-1) );
```

(c). $\frac{x^2+3\,x+2}{x^2-3\,x+2}\ \ \frac{x^2-4}{x^2+4\,x+3}$

```
> simplify( (x^2+3*x+2)/(x^2-3*x+2) * (x^2-4)/(x^2+4*x+3) );
```

(d). $\frac{4\,y-16}{5\,y+15}$ divided by $\frac{4-y}{2\,y+6}$ (pay careful attention to match up the parentheses here)

```
> simplify( (4*y-16)/(5*y+15) / ( (4-y)/(2*y+6) )  );
```

3. Solve each of the following equations.

(a). $2\,(x+2)=14$

```
> solve( 2*(x+2)=14, x );
```

(b). $\frac{x}{5}-\frac{x}{3}=2$

```
> solve( x/5-x/3 = 2, x );
```

(c). $8(x+2)-3(2x+1)=2(2x+5)-1$

```
> solve( 8*(x+2)-3*(2*x+1)=2*(2*x+5)-1, x );
```

(d). $\frac{1}{x-2}+\frac{3}{x+3}=\frac{4}{x^2+x-6}$

```
> solve( 1/(x-2) + 3/(x+3) = 4/(x^2+x-6), x );
```

4. Suppose that you are driving on a highway to a town that is 300 miles from your home. After 30 minutes you pass an exit which you know to be 50 miles from your home. Assuming that you continue at the same constant speed, how long will it take for the entire trip?

   ANSWER: 3 hours

5. A picture frame has a total perimeter of 2 meters. The height of the frame is one half the width. Find the dimensions of the frame.

   ANSWER: width of 2/3 meter and height of 1/3 meter.

6. One positive number is one-fifth of another number. The difference between the two numbers is 76. Find the numbers.

   ANSWER: 95 and 19.

7. Write each of the following expressions in standard polynomial form:

   (a). $2x-5=2-x$
   Answer: $3x-7=0$**.**

   (b). $\frac{1}{2}(3x^2+10)=3x$

   Answer: $\frac{3x^2}{2}-3x+5=0$ **or** $3x^2-6x+10=0$**.**

8. Solve each of athe following equations using the specified method:

(a). $16\,x^2 - 9 = 0$ (using factoring)

```
> factor( 16*x^2 - 9 );
> solve( 4*x-3=0, x );
> solve( 4*x+3=0, x );
```

(b). $x^2 + 4\,x = 0$ (complete the square)

```
> with(student);
> left := completesquare( x^2+4*x );
> NewEq := left + 4 = 0 + 4;
> solve( NewEq, x );
```

(c). $2\,x^2 - x - 1 = 0$ (using quadratic formula)

```
> solve( 2*x^2-x-1=0, x );
```

9. Solve the following equations using any convenient method. If there is no solution, explain how you know this to be the case.

(a). $\sqrt{3\,x + 10} - x = 2$

```
> solve( sqrt(3*x+10) - x = 2, x );
```

(b). $\frac{1\,x^2}{3} - 5\,x + 25 = 0$

```
> solve( 1/3*x^2-5*x+25 = 0, x );
```

These two answers are complex numbers; there are no real answers. The easiest way to determine this in advance is to check the discriminant:

```
> a := 1/3;  b := -5;    c := 25;
> b^2-4*a*c;
>
```