```
> restart;
> #Maple Solutions to Honors Calculus Math 182 Quiz 2
> #PROBLEM 1
> Q1:=3*x^2;
```

$$Q1 := 3\,x^2$$

```
> int(Q1,x);
```

$$x^3$$

```
> #so obviously choice (A) is okay.  Now check the other choices:
> Q1b:=x^3-7;
  Q1c:=(x-1)^3+3*x^2-3*x;
```

$$Q1b := x^3 - 7$$

$$Q1c := (x-1)^3 + 3\,x^2 - 3\,x$$

```
> diff(Q1b,x);
```

$$3\,x^2$$

```
> temp:=diff(Q1c,x);
```

$$temp := 3\,(x-1)^2 + 6\,x - 3$$

```
> simplify(temp);
```

$$3\,x^2$$

```
> #therefore the answer is (D) all of the above.
> #PROBLEM 2
> Q2:=2*sin(2*x);
```

$$Q2 := 2\sin(2\,x)$$

```
> int(Q2,x);
```

$$-\cos(2\,x)$$

```
> #This doesn't appear on the list, but rules out choices (B), (C) and (D).
> #By process of elimination (A) must be correct.  Check to be sure.
> Q2a:=sin(x)^2-cos(x)^2;
```

$$Q2a := \sin(x)^2 - \cos(x)^2$$

```
> temp:=diff(Q2a,x);
```

$$temp := 4\sin(x)\cos(x)$$

```
> simplify(Q2-temp);
```

$$0$$

```
> #since the difference is 0 then (A) is an antiderivative.
```

```
> #PROBLEM 3
```

```
> Q3:=log(1/(x^2+2*x+1));
```

$$Q3 := \ln\left(\frac{1}{x^2+2x+1}\right)$$

```
> temp:=int(Q3,x);
```

$$temp := \ln\left(\frac{1}{(x+1)^2}\right)(x+1)+2x+2$$

```
> factor(temp);
```

$$\left(\ln\left(\frac{1}{(x+1)^2}\right)+2\right)(x+1)$$

```
> #This is not on the list but is close to all of them.
  #At this point it is probably easiest to find the correct choice by
  further simplifications
  #done by hand.  Namely, log(1/(x+1)^2)= -2log(abs(x+1)) indicates the
  correct choice is (C).
```

```
> #PROBLEM 4
```

```
> Q4:=1/sqrt(4+x^2);
```

$$Q4 := \frac{1}{\sqrt{4+x^2}}$$

```
> int(Q4,x);
```

$$\operatorname{arcsinh}\left(\frac{1}{2}x\right)$$

```
> #Note that asinh and arcsinh are the same function so (C) contains an
  antiderivative.
  #Given choices (D) and (E) some additional work is needed.
```

```
> Q4a:=log(x+sqrt(x^2+4));
```

$$Q4a := \ln\left(x+\sqrt{4+x^2}\right)$$

```
> temp:=diff(Q4a,x);
```

$$temp := \frac{1+\frac{x}{\sqrt{4+x^2}}}{x+\sqrt{4+x^2}}$$

```
> simplify(temp);
```

$$\frac{1}{\sqrt{4+x^2}}$$

```
> #Therefore (A) is also an antiderivative.  Obviously (B) is off by a
  factor of 2 so the
  #correct choice is (D).
> #PROBLEM 5
> #By definition of the hyperbolic sine function the area given by A=t/2
  where sinh(t)=4/3.
  #Therefore the answer to part 5(ii)
> Q5i:=1/2*arcsinh(4/3);
```

$$Q5i := \frac{1}{2}\,\mathrm{arcsinh}\left(\frac{4}{3}\right)$$

```
> #The decimal approximation is obtained using evalf
> evalf(Q5i);
```

$$0.5493061440$$

```
> #The derivatives are surely easier to do by hand.  But for completeness
  here they are with Maple.
> Q6i:=abs(sin(x))^3;
```

$$Q6i := |\sin(x)|^3$$

```
> temp:=diff(Q6i,x) assuming x::real;
```

$$temp := 3\,|\sin(x)|^2\,\mathrm{signum}(\sin(x))\cos(x)$$

```
> simplify(temp);
```

$$3\,|\sin(x)|\,\cos(x)\sin(x)$$

```
> Q6ii:=7*arctan(x^2);
```

$$Q6ii := 7\arctan(x^2)$$

```
> diff(Q6ii,x);
```

$$\frac{14\,x}{1+x^4}$$

```
>
```