1. Call the product P and consider what happens when we multiply by . We have . Thus we have that . B
2.  then  and . Thus we have that  from which it is clear that . This means that . From here we evaluate . D
3. It is well known that . Thus the series becomes . C
4. Check for absolute convergence:  . Thus the series converges absolutely. A
5. Check for absolute convergence: . Thus the series converges absolutely. A
6. Comparison test. Clearly  which is a convergent series. Thus the series converges absolutely. A
7. Alternating Series Test:

i) 

ii)

so the series converges conditionally. To check absolute convergence we can use the comparison test with  because . Thus since  diverges then both diverge. B

1. Integral Test: . Thus the series diverges. C
2. Since  we have that .

Thus . A

1. This is a geometric series with common ratio . Thus for the series to converge we need that . Solving for x gives . B
2. Consider . Thus we have that . Taking the limit gives . C
3. So . Thus we are asked to evaluate . D
4. Rearranging yields  which is the Riemann sum representing the integral . C
5. This is an infinite geometric series with first term 1 and common ratio -1/2. The sum is thus . C
6. We can use the ratio test so that we get . Thus we have that  and checking both endpoints gives divergent series. B
7. The sum reduces in the following way: . E
8. The MacLaurin series for the individual functions are  and  so that 

Summing the coefficients gives . B

1. We know the Taylor Series centered at x =0 for. Thus  from which we can integrate to get 

C

1. Working with the series expansion for the exponential we have that and taking the first derivative of both sides gives  from which is follows that . Differentiating both sides again yields . Finally we have that  and we can then evaluate at x=7 to find that . A
2. The first term in our series is  and our sum is given such that  thus we can solve for r so that . C
3. Notice that  is the Taylor series centered at x=0. Thus . A
4.  from which we have that  . A
5. Let . Rearranging yields  from which it follows that  but since the sum is positive that answer must be . A
6. The binomial expansion can be found by finding the first three terms of the MacLaurin series expansion for the function. Taking successive derivatives yields  and . Thus . B
7. . D
8. So . Continuing in this fashion we find that .C
9. For a geometric series approximated by its first n terms the error is . Thus we are looking for .D
10. This is an infinite geometric series that will converge if its common ratio is bounded within a unit of zero. Thus we want that  from which it follows that  and  . C
11. The coefficient on the  term in the Taylor series expansion is  . Thus we are looking for . Derivatives of cosine have period 4 thus  and we have that . D
12. This is the Taylor series for  evaluated at . Thus we have that the sum should be . B